MATERIAL SAFETY DATA SHEET

SRM Supplier: National Institute of Standards and Technology
Standard Reference Materials Program
100 Bureau Drive, Mail Stop 2321
Gaithersburg, Maryland 20899

SRM Number: 211d
MSDS Number: 211d
SRM Name: Toluene Liquid Density
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See MSDS Revision History on Last Page

MSDS Coordinator: Carmen S. Davis
Phone: (301) 975-6776
ChemTrec: 1-800-424-9300

FAX: (301) 926-4751
E-mail: SRMMSDS@nist.gov

SECTION I. MATERIAL IDENTIFICATION

Material Name: Toluene Liquid Density

Description: SRM 211d consists of four flame-sealed glass ampoules, each containing approximately 5 mL of high purity toluene.

Other Designations: Toluene (methyl benzene; methyl benzol; phenylmethane; toluol)

Name	Chemical Formula	CAS Registry Number
Toluene	$C_6H_5CH_3$	108-88-3

DOT Classification: Flammable Liquid, UN1294

Manufacturer/Supplier: Available from a number of suppliers

SECTION II. HAZARDOUS INGREDIENTS

Hazardous Component	Nominal Concentration (%)	Exposure Limits and Toxicity Data
Toluene	~ 100	ACGIH TWA: 500 mg/kg (skin)
		OSHA TLV-TWA: 100 mg/kg or 377 mg/m^3
		OSHA STEL: 150 mg/kg or 565 mg/m^3
		NIOSH TWA: 100 mg/kg or 375 mg/m^3 (recommended for 10 h)
		Human Oral: LD_{LO}: 50 mg/kg
		Human, Inhalation: TC_{LO}: 200 mg/kg
		Rat, Oral: LD_{50}: 636 mg/kg
		Rat, Inhalation: LC_{50}: 49 g/m^3/4 h

SECTION III. PHYSICAL/CHEMICAL CHARACTERISTICS

Toluene	
Appearance and Odor: colorless liquid with a distinct odor	**Vapor Pressure (@ 20 °C):** 22 mm Hg
Relative Molecular Mass: 92.14	**Evaporation Rate (butyl acetate = l):** 2.24
Density: 866.83 kg/m^3	**Viscosity (@ 20 °C):** not available
Boiling Point: 111 °C	**Water Solubility (@ 25 °C):** 0.05 %
Freezing Point: -95 °C	**Solvent Solubility:** soluble in alcohol, ether, benzene, chloroform, and acetone

SECTION IV. FIRE AND EXPLOSION HAZARD DATA

Flash Point: 4.4 °C **Method Used:** Closed Cup **Autoignition Temperature:** 480 °C

Flammability Limits in Air (Volume %): **UPPER:** ~ 7.1
LOWER: ~ 1.2

Unusual Fire and Explosion Hazards: Toluene is a severe fire and explosion hazard. Its vapors are heavier than air and may travel a considerable distance to a source of ignition and flash back. Vapor and air mixtures are explosive. Aromatic hydrocarbons react with strong oxidizing agents.

Extinguishing Media: Use alcohol-resistant foam, dry chemical, carbon dioxide, or water spray.

Special Fire Procedures: Toluene is a highly flammable liquid (OSHA Class lB flammable liquid). It must be kept away from heat sources, sparks, and open flames. Fire fighters should wear a self-contained breathing apparatus (SCBA) along with proper eye and skin protection.

SECTION V. REACTIVITY DATA

Stability: **X** **Stable** _____ **Unstable**

Conditions to Avoid: Avoid contact with heat, sparks, flames, or other sources of ignition. Avoid inhalation of vapors or combustion byproducts. Avoid contact with the skin.

Incompatibility (Materials to Avoid): Toluene is incompatible with combustible materials, halogens, acids, metal salts, and oxidizing materials.

See Section IV**:** *Unusual Fire and Explosion Hazards*

Hazardous Decomposition or Byproducts: Thermal decomposition products may include toxic oxides of carbon.

Hazardous Polymerization _____ **Will Occur** **X** **Will Not Occur**

SECTION VI. HEALTH HAZARD DATA

Route of Entry: **X** **Inhalation** **X** **Skin** **X** **Ingestion**

Toluene: Toluene may be harmful if swallowed, inhaled, or absorbed through skin. Vapor or mist is irritating to the skin, eyes, mucous membranes, and upper respiratory tract. Prolonged or repeated exposure may cause vomiting, insomnia, nosebleeds, chest pains, euphoria, headache, vertigo, nausea, anorexia, tinnitus, impaired speech and vision, momentary loss of memory, and loss of coordination. Chromosome changes have been observed in workers exposed to toluene. Reproductive effects have been reported in animals and human studies indicate that toluene may cross the placenta.

Medical Conditions Generally Aggravated by Exposure: kidney, liver, respiratory, skin disorders, and allergies

Listed as a Carcinogen/Potential Carcinogen:

	Yes	No
In the National Toxicology Program (NTP) Report on Carcinogens		X
In the International Agency for Research on Cancer (IARC) Monographs		X
By the Occupational Safety and Health Administration (OSHA)		X

EMERGENCY AND FIRST AID PROCEDURES:

Skin Contact: Remove contaminated shoes and clothing. Rinse affected area with large amounts of water followed by washing the area with soap and water. Watch for chemical irritations and treat them accordingly. Obtain medical assistance.

Eye Contact: Immediately flush eyes, including under the eyelids, with copious amounts of water for at least 15 minutes. Obtain medical assistance.

Inhalation: If inhaled, move the victim to fresh air. If breathing is difficult, give oxygen; if the victim is not breathing, give artificial respiration. Obtain medical assistance if necessary.

Ingestion: If ingested, wash out mouth with water. Obtain medical assistance immediately.

TARGET ORGAN(S) OF ATTACK: central nervous system (CNS)

SECTION VII. PRECAUTIONS FOR SAFE HANDLING AND USE

Steps to be Taken in Case Material Is Released or Spilled: Notify safety personnel of major spills and/or leaks. Evacuate nonessential personnel. Stop the leak if one can do so without risk. Absorb small spills with sand or other absorbent material and place into appropriate containers for disposal.

Waste Disposal: Follow all federal, state, and local laws governing disposal.

Handling and Storage: Persons handling this material must wear protective eyewear, clothing, and gloves to prevent contact with the material.

> **NOTE:** Contact lenses pose a special problem; soft lenses may absorb irritants and all lenses concentrate them. **DO NOT** wear contact lenses in the laboratory.

This material should be stored in a cool, dry, well-ventilated area away from incompatible materials and conditions. Protect containers from physical damage.

SECTION VIII. SOURCE DATA/OTHER COMMENTS

Sources: MDL Information Systems, Inc., MSDS *Toluene*, 01 June 2000.

MSDS Revision History: 05 May 2003 (This revision reflects a correction in the UN shipping number and editorial changes); 20 February 2001 (Original MSDS date).

Disclaimer: Physical and chemical data contained in this MSDS are provided only for use in assessing the hazardous nature of the material. The MSDS was prepared carefully, using current references; however, NIST does not certify the data on the MSDS. The certified values for this material are given in the NIST Certificate of Analysis.